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EXPERIMENTAL ANALYSIS OF INFORMATION CONTENT OF
AN AURAL ELECTRICAL FIELD OF THE HUMAN BODY

by

P. I. Gulyayev, V. I. Zabotin,
et al.

FOREIGN TECHNOLOGY DIVISION

EDITED TRANSLATION

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Block	Italic	Transliteration	Block	Italic	Transliteration
А а	*А а*	A, a	Р р	*Р р*	R, r
Б б	*Б б*	B, b	С с	*С с*	S, s
В в	*В в*	V, v	Т т	*Т т*	T, t
Г г	*Г г*	G, g	У у	*У у*	U, u
Д д	*Д д*	D, d	Ф ф	*Ф ф*	F, f
Е е	*Е е*	Ye, ye; E, e*	Х х	*Х х*	Kh, kh
Ж ж	*Ж ж*	Zh, zh	Ц ц	*Ц ц*	Ts, ts
З з	*З з*	Z, z	Ч ч	*Ч ч*	Ch, ch
И и	*И и*	I, i	Ш ш	*Ш ш*	Sh, sh
Й й	*Й й*	Y, y	Щ щ	*Щ щ*	Shch, shch
К к	*К к*	K, k	Ъ ъ	*Ъ ъ*	"
Л л	*Л л*	L, l	Ы ы	*Ы ы*	Y, y
М м	*М м*	M, m	Ь ь	*Ь ь*	'
Н н	*Н н*	N, n	Э э	*Э э*	E, e
О о	*О о*	O, o	Ю ю	*Ю ю*	Yu, yu
П п	*П п*	P, p	Я я	*Я я*	Ya, ya

*ye initially, after vowels, and after ъ, ь; e elsewhere. When written as ё in Russian, transliterate as yё or ё. The use of diacritical marks is preferred, but such marks may be omitted when expediency dictates.

GREEK ALPHABET

Alpha	Α α	Nu	Ν ν
Beta	Β β	Xi	Ξ ξ
Gamma	Γ γ	Omicron	Ο ο
Delta	Δ δ	Pi	Π π
Epsilon	Ε ε ϵ	Rho	Ρ ρ ϱ
Zeta	Ζ ζ	Sigma	Σ σ ς
Eta	Η η	Tau	Τ τ
Theta	Θ θ ϑ	Upsilon	Υ υ
Iota	Ι ι	Phi	Φ φ ϕ
Kappa	Κ ϰ κ	Chi	Χ χ
Lambda	Λ λ	Psi	Ψ ψ
Mu	Μ μ	Omega	Ω ω

RUSSIAN AND ENGLISH TRIGONOMETRIC FUNCTIONS

Russian	English
sin	sin
cos	cos
tg	tan
ctg	cot
sec	sec
cosec	csc
sh	sinh
ch	cosh
th	tanh
cth	coth
sch	sech
csch	csch
arc sin	$\sin^{-1}$
arc cos	$\cos^{-1}$
arc tg	$\tan^{-1}$
arc ctg	$\cot^{-1}$
arc sec	$\sec^{-1}$
arc cosec	$\csc^{-1}$
arc sh	$\sinh^{-1}$
arc ch	$\cosh^{-1}$
arc th	$\tanh^{-1}$
arc cth	$\coth^{-1}$
arc sch	sech^{-1}
arc csch	csch^{-1}

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rot	curl
lg	log

GRAPHICS DISCLAIMER

All figures, graphics, tables, equations, etc. merged into this translation were extracted from the best quality copy available.

EXPERIMENTAL ANALYSIS OF THE INFORMATION CONTENT OF AN AURAL ELECTRICAL FIELD OF THE HUMAN BODY

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In preceding works we established experimentally that the vital activity of living substances is also manifested in the form of electromagnetic fields which they generate and which are propagated in space around them with the speed of light. Living substances actively create an "electrical aura" around themselves in space which carries information about the functional state of the body's organs and cannot but influence the environment and other organism.

Two sources of aural fields have been discovered. The first is the internal fluctuating electrotonic field of the body's active organs while the second is the triboelectrical static charges of the body's surfaces. A procedure has been developed for recording the variable electrical component of aural fields which opens up the opportunity for the broad experimental study of their information content (Gulyayev, 1967; Gulyayev, Zabotin, Shlippenbakh, 1967, 1968a, b; Zabotin, 1968).

For a detailed analysis of the information content of an aural electrical field of the human body we employed the recording of its electrical component on an ink oscillograph under conditions

of the shielding of the chamber by a method which we described in preceding articles.

The one being tested lay in his everyday clothing, his head rested on a pillow and his hair was bound by a cotton neckerchief. The very first tests showed that the aural field of the human body contains information not only about the electrical activity of the cardiac muscle, which is usually recorded by the contact method in an EKG,but also about other manifestations of body activity, for example about the mechanical activity of the heart which is recorded by a contact ballistocardiogram, about respiratory movements, and about the movements of the muscles and parts of the body. It also turned out that each type of this information can be separated from the field and recorded separately.

The electroaurogram (EAG) which was recorded above the region of the chest of the one being tested (Fig. 1) contains much varied information which can be divided into individual aural components pertaining to various sources. Two methods were used to separate components which pertain only to the electrical activity of the heart which is usually recorded in an EKG from the total aural field. The first consisted of fixing the distance of the probe from the chest in order to decrease the mechanical oscillations of the latter in regard to the probe. A cardboard cylinder which fixes the distance from the probe to the chest was placed between the aural sensor and the surface of the chest in the region of the left nipple. The probe was located inside the cylinder without coming in contact with it.

When fixing the distance of the probe from the chest the shape of the EAG changed sharply and primarily only the electrical activity of the heart was recorded on it (Fig. 1C). Figure 1B shows the simultaneous contact registration of the EAG. A visual comparison shows that the teeth of the EKG (Q, R, S, T) are also reflected in the EAG but tooth P is not noticeable in it.

Experiments were set up to establish the reasons for the absence of tooth P in the EAG and also the precision of performance of the rhythms of the EKG and EAG. For this, the probe of the aural sensor was placed directly on the skin of the chest of the one being tested in the same place above which the EAG was also recorded. It turned out that with contact registration with a probe all teeth are reflected from the chest, i.e., P, Q, R, S, T. But tooth P has very low amplitude in the contact registration in comparison with lead II of the EKG; therefore, it is not noticeable visually on the EAG, either. With the employment of electronic computers for the analysis of the EAG, it may be possible to discover all the teeth of the EKG as well as much other additional information. The frequency of the heart's rhythm is reproduced precisely in the EAG.

Other teeth can be seen in the EAG which are unnoticed in the EKG. They reflect additional information of the aural field whose value is still to be explained.

The aural lead in the vicinity of the brow under the same conditions showed approximately the same picture. But, apparently, even here there is some additional information which is concealed from visual analysis.

Another method for distinguishing the electrical activity of the heart from the total picture of the EAG consists of limiting the frequency characteristic of the recorder. Here, it is no longer required to have the rigid fixing of the probe in relation to the surface of the chest, and the probe is located in the air without any mechanical connection with the human body. As the frequency characteristic is limited in the region of both low and high frequencies, the amount of information in the EAG which is accessible for visual analysis decreases. Figure 1E shows the EAG with limitation of frequency in both directions from 50 Hz. The heart's rhythm is completely preserved but teeth P, Q, S, T are lost visually. Nevertheless, much more additional information whose significance is to be explained is recorded on the EAG.

The limitation of the frequency characteristic due to the suppression of low frequencies leads to a decrease in the amplitude of slow oscillations in the EAG but the possibility for analysis of the frequency of cardiac rhythm remains in all cases.

As we have already noted, the total aural field of the organism in the first approximation contains two components - electrotonic and triboelectrical. The first of them arises as a continuation in space outside the body of the internal variable electrotonic field of active organs - nerve, heart, muscle, brain. The second arises due to the mechanical motion of parts of the body which carry a surface triboelectric charge. We have shown that a grounded isolated frog nerve which does not accomplish any mechanical movements in its activity and which does not carry a triboelectrical charge has an aural field which, in its pure form, is only a continuation of the internal electrotonic field of the nerve. This is the electrotonic component of the aural field in pure form which carries information about the functional condition of the organ which creates it.

A triboelectrical charge which creates one more component of the aural field arises on the surface of the body of a person and animals. With mechanical movements of the body - heartbeat, pulse wave, respiration, muscular contraction - the triboelectrical component changes and is one more source of information about the functional condition of the organism.

Thus, the aural field contains information about the electrical condition of the organ which reflects the course of physico-chemical processes in it and about the mechanical movement of organs and about the physico-chemical condition of the body surface. At present, we are continuing an analysis of the auragram to learn the effect of the ballistic phenomena of the cardiac muscle, pulse wave, and respiratory motions of the chest cage on the EAG.

Movement with cilia, the straining of the face and mouth muscles, movement of the tongue without opening the mouth, compression of the teeth, swallowing motions, movement of the muscles of the chest, hands, or feet without their movement or movement with parts of the body, counting in a loud voice - all this is reflected in the EAG in the form specific rhythms. The EAG carries a large quantity of information about the activity of the body and provides an objective representation of the space-functional condition of the one being tested.

Preliminary experiments have shown that the different parts of space around a person are unequal in the sense of recording the various manifestations of the body's activity. In the region of the head it is primarily auraactograms which are recorded - aural fields of the face muscles which arise from the motion of the cilia, mouth, swallowing, chewing, movement of the tongue, mimic motions (Fig. 2), and straining of the muscles of the hands and feet (Fig. 3). In the region of the chest, it is primarily the aural field which arises during respiration (aurapneumogram) the beating of the heart (auraseismocardiogram), and the straining of the chest muscles (auraactogram) which is recorded (see Fig. 4), in which regard the left leg is grounded.

The large amount of information in the EAG and its analysis in accordance with sources of origin and in accordance with the functional condition of these sources require the employment of modern electronic equipment and, first of all, electronic computers. Regular methods of analysis (visual - from form and frequency, excitation and suppression by physiological and physical methods) are insufficient. A special feature of auragraphy is the fact that a large portion of the information listed above can be recorded by one sensor in one point of the aural field.

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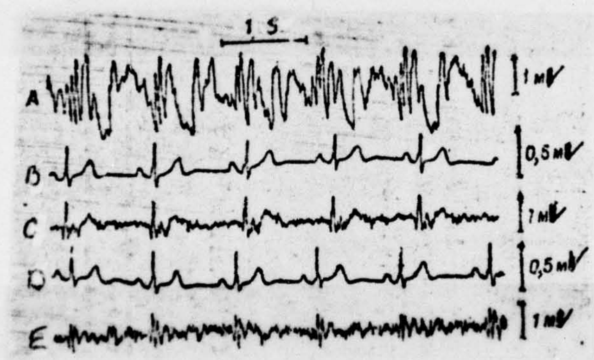

Fig. 1. Electroaurogram recorded above the chest region of the one being tested. A - total EAG recorded at a distance of 1 cm from the chest of the one being tested, Δf - 10-50 Hz; B - electrocardiogram recorded by the contact method (lead II); C - EAG with the fixing of the distance of the probe from the chest recorded at a distance of 1 cm, Δf - 10-50 Hz (B and C recorded simultaneously); D - electrocardiogram recorded by the contact method (branch II); E - EAG recorded at a distance of 1 cm from the chest without the fixing of the probe. Frequency bands (Δf) are limited in both directions from 50 Hz (D and E recorded simultaneously). Diameter of the probe in all experiments 4 cm.

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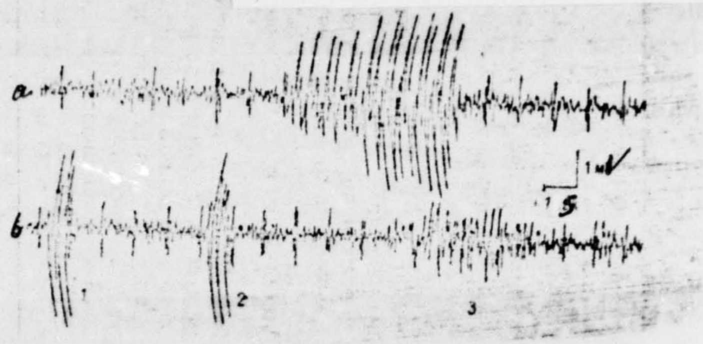

Fig. 2. Auraactograms from the motion of the face muscles. A - auraactogram which arises from the blinking of the eyes and recorded at a distance of 1 cm between the forehead and the probe; B - auraactogram which arises from the straining of the mouth muscles (1 and 2) and the movement of the tongue with the mouth closed (3), recorded at a distance of 1 cm between the probe and the forehead. Diameter of the probe in all experiments 4 cm, Δf limited in both directions from 50 Hz.

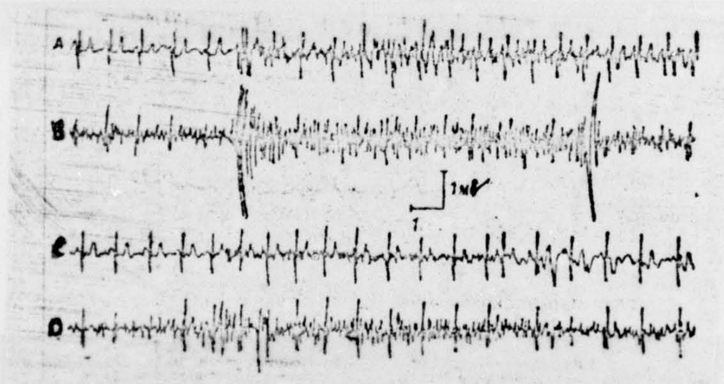

Fig. 3. Auraactograms from the movement of the muscles of the feet and chest muscles. A - electrocardiogram (lead II) recorded by the normal contact method. The currents of the action which arise from the straining of the muscles of both legs of the one being tested can be seen; B - auraactogram which arises from the straining of the muscles of both legs of the one being tested and recorded at a distance of 1 cm between the probe and the forehead; C - electrocardiogram (lead II) recorded by the normal contact method. Currents of the action of the chest muscles of the one being tested can be seen; D - auraactogram which arises from the straining of the chest muscles recorded at a distance of 1 cm between the probe and the forehead. In tests B and D the diameter of the probe is 4 cm, Δf is limited in both directions from a frequency of 50 Hz. A and B, and C and D recorded simultaneously.

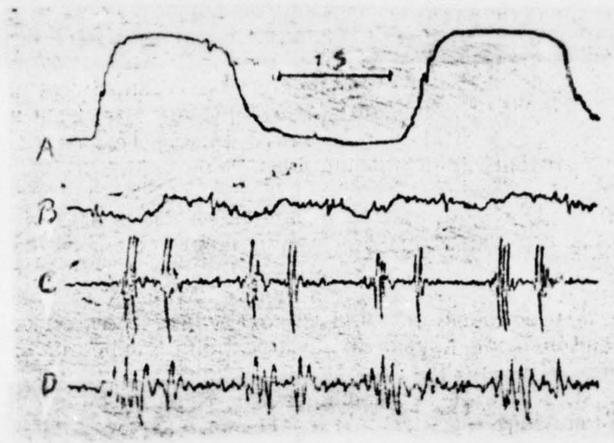

Fig. 4. A - aurapneumogram recorded at a distance of the probe from the chest equal to 6 cm; B - check, the one being tested does not breathe and the respiration waves disappear from the auragram. The pulse rhythm is noticeable on curve B; C - seismocardiogram recorded by a seismic sensor located on the chest of the one being tested; D - auraseismocardiogram recorded at a distance of 6 cm from the chest; A and B, and C and D recorded simultaneously.

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